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Journal of the Society of Arts.

FRIDAY, DECEMBER 8, 1854.

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FOURTH ORDINARY MEETING.

Wednesday, December 6, 1854.

The Fourth Ordinary Meeting of the One Hundred and First Session, was held on Wednesday, the 6th instant, J. B. Lawes, Esq., in the chair.

The following Candidates were balloted for, and duly elected :—

Colfox, William, B.A.	Hunt, Joseph.

The following Institution has been taken into Union since the last announcement :—

381. Rye, Mechanics' Institution.

The paper read was

FOURTH PAPER ON BRITISH AGRICULTURE, WITH SOME ACCOUNT OF HIS OWN OPERATIONS AT TIPTREE HALL FARM.

By I. J. Mechi.

This is the fourth time I have had the honour to appear before our Society; but I offer no apology, because I believe that there is no question at the present moment so important to the national welfare, as the attempt to increase our supply of food by improved British Agriculture. The stomach brooks no delay; and, unless duly supplied, there is an end at once to art, science, commerce, and manufactures; honour and glory succumb to short commons. When this country was purely agricultural, and we exported corn, our anxiety was about clothing and manufactures; but now that mighty steam and scientific appliances have enabled our mechanical millions to envelope the world in cloth and calico, and now that this vast and increasing population has outstripped the limited acreage of our little island, the question of food enough by home-improvement, or by foreign supplies, has become one of vital import.

There is something of stern admonition in our present food position. With an abundant harvest, for which we have just returned grateful thanks, the price of corn is enormous. An abundant home-harvest is not now enough for the increased population; and, therefore, because some of our foreign supplies are cut off by accidental circumstances, Consols are depressed; confidence is withdrawn; circulation contracted; trade, commerce, and manufactures are paralyzed, with a prospect of much individual suffering and privation.

I venture to assert, from my own experience, that we could grow more than all the food that is required by the British people; but it must be done by investment and improvement.

The mere drainage of all the land that requires it would add millions of quarters of corn, and much additional meat to our present supply.

My own farm may be taken as an instance of greatly and amply increasing our food supply.

I therefore purpose this evening to lay before you my own agricultural balance-sheet, which is again highly satisfactory and remunerative, showing an advantage to me in rent and profit of about £750.

I shall glance at the progress of British agriculture, and enter into some details connected with its internal economy, thinking that such information may be a useful preparative for those who, like myself, hitherto engaged in other pursuits, may be disposed to divert some portion of their capital to agricultural practice and amendment.

I do not know anything more rational and more desirable than that the surplusage of our town and city profits should find useful employment on the land. It is much needed. The agricultural cry is always, "but where is the money to come from for these great improvements?" and therefore every landlord and tenant should rejoice at an increase of "apron-string" farmers and improvers, seeing that the inflowing of capital and intelligence diminishes rates and increases profits and comforts in a thousand various ways.

If I were to ask "Why so little town capital finds its way to agricultural improvement?" I should say, you have hitherto not held out to it the hand of invitation.

Great landed proprietors, with poor, unimproved and entailed estates, either from want of knowing that means for their improvement exist, or from a false delicacy as to borrowing the money, or from a disbelief or doubt of the improvements resulting profitably to themselves and their tenantry, have not generally availed themselves to any extent of the two or three existing companies which have the means and legal powers to effect every necessary amendment, even on strictly entailed estates.

I know a great many small landholders whose property and tenantry would be equally benefited by such investments.

In a national point of view, it would be highly desirable that some hundred millions of our surplus capital should be engaged in producing British food on British soil by British means and labour*—rather than that the cash boxes of our capitalists should be crammed with bonds and responsibilities from every foreign nation and foreign undertaking—to the very casting of Russian cannon to be used against our own troops. I could readily point out how one hundred millions could be at once *profitably* employed in agricultural amendment. But ere this can be done there is an immense amount of prejudice to be removed, and self-satisfaction to be disturbed.

This is not an age of impossibilities—on the contrary, steam, gas, railways, electric telegraphs, Britannia tubes, suspension bridges, and chemical discoveries, which were all once considered visionary, have become realities, working immense changes, and affecting largely the comforts and intelligence of our own country and of the whole world.

I venture then to predict that, in a comparatively short period, we shall see every farmery covered in with sufficient shelter for its stock, lighted with gas, its fixed steam-engine, economizing the costly labour of horses, and warming by its waste steam the various sheds. The food which the farm produces having done its office in the town will run back to restore the fertility which it had exhausted—our land will be drained and irrigated—the residences will be worthy of a more intelligent tenantry, possessing greater capital, and rejoicing in pianos and libraries. The waste and loss occasioned by misplaced buildings, bad roads, and queer-shaped fields, will be corrected by the facile sale or transfer and interchange caused by an easy legal registration.

It is a great point to provoke people to *talk* about such matters, causing first a little wonder, anger, disbelief, inquiry, and ultimate calculations and conviction.

Our British agriculture must progress with the other interests of the country. I often, on a summer's morning, before the business of London commences, take a reflective stroll, and ponder on our rapid increase of wealth and intelligence, as evidenced by our new and magnificent streets and buildings; queer old quaint buildings are swept away, and you see rising in their room business palaces, involving enormously increased rentals, and built of stone and iron, as if never to decay.

This is real economy where there is capital, and I naturally, on these occasions, wish that I had on either side of me the prejudiced defenders of our rotten and inefficient farmeries, exhibiting in their decay the rotten thatch and dripping eaves—the beau ideal of rustic landscape.

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* By companies, or by an improved law of partnership.

If we have capital in this country—and who can deny that we have it in superabundance?—let it avail to give to agriculture a higher and more dignified, more intelligent, and, consequently, a more profitable position. The clumsy appliances and prejudiced neglects of antiquated agricultural customs, are *not* profitable. The men who now suffer most in agriculture are precisely those whose ill-farmed, wooded, small, and undrained fields, and unimproved buildings, are slowly but surely absorbing the tenant's capital, binding him in poverty and discontent. It will be a happy day for the tenantry of this country when their rents are doubled, provided that increase represents a proper interest for necessary improvements. This takes place in our towns and cities—why not in our agriculture?

I do attach much importance to the application of our town sewage to agricultural fructification. It is going on rapidly in various quarters; and I have been delighted to find that my intelligent and calculating friend, Mr. Samuel Brooks, of Manchester, has placed at the disposal of the Managing Council of that city, the munificent sum of one thousand pounds, to be expended in prizes, or means to obtain the best mode of applying the sewage of that city to the fructification of the surrounding country.

My own experience in this matter, with two miles of pipe on my farm, convinces me that the engineering difficulties are perfectly insignificant, and that a nation which has passed its iron railways through every man's house and property, *nolens volens*, for a useful general purpose, will not be deterred from acting similarly in the great question of feeding the British people. We have local commissioners for superintending the drainage of our fens, and why not for irrigating with our town sewage?

I will not insult this meeting with details on so simple a question, for pumping and conveying manure is no other than diffusing water, every fractional detail of which is perfectly well understood, and can be at once readily calculated.

One thing is quite certain, that you must convince landlords and tenants that manure liquified is *better* and more available than *solid* manure; this it will take some time to do, and you must also convince engineers that they do not at all know at present the greediness of soil for manure, for if they did, a recent writer in your Journal would never have made the mistake of over-estimating some *thirty times*, the area that would appropriate the sewage of the metropolis.

Our excrement is literally our food, disagreeable and disgusting in form and smell, but unaltered in elementary value. Injurious to man, it is vitality to plants; and much of the luxuriant vegetables that grace our table, are a merere-embodiment of our own excreta. The time is gone by for false delicacy in these matters —we must entertain this great privy question. The Chinese would be starved, did they follow our example; but that wise people economise with rigid care that which they alone depend upon for the reproduction of their food. I am informed they do not, as we do, fatten cattle at a loss, with purchased food, to produce manure for the growth of corn.

In order to form some idea of the extent to which our food might be increased by the application of town sewage, let us consider that 300 sheep on a farm of 100 acres would keep it in a high state of fertility, and that, therefore, reckoning 450 men, women, and children, as equivalent to 300 sheep, our population would fertilize 600,000 additional acres.

I say nothing of dogs, cats, parrots, canary birds, and horses—they consume largely, each horse consuming the food of eight men; then you have enormous supplies of waste blood and offal, and a thousand other things that should add millions of quarters to your food.

The mere disintegration of your alkaline granites by the abrasion and trituration of traffic—the carbon, or smuts from your roofs, which is but too perceptible after a shower, are all sources of fertility.

Amongst the coming improvements in agriculture, is—

CULIVATION BY STEAM.

On public grounds, I expended some money in the construction of Mr. Romaine's machine. Our trials with it were only partially successful; we had too much velocity, and too little steam. The act of raising the soil must evidently be by a slow steady motion. Enough, however, was shown, to prove that cultivation by steam will soon be the order of the day: several parties are engaged upon it, and I have a strong impression that Mr. Usher's, of Edinburgh, will not be one of the least successful. I find there is one at work in Germany, of which a drawing lies on the table, for your inspection. I think Mr. Romaine's has an advantage, by the attachment of horse-power in the case of undulating surfaces; but I need hardly tell you, that it requires an immensity of time, and no small investment of capital, to bring new inventions to perfection.

The Royal Agricultural Society of England have very properly offered a premium of £200, which will no doubt develop many attempts.

When we consider that the farm horses consume the produce of nearly one-fourth of the arable land of the country, and when we calculate for how few hours daily they can be kept at work, the whole question is one of great importance to agriculture and to the nation.

I hope now that *Agricultural Statistics* are becoming acceptable, that we shall have comprehensive details of the number of acres undrained, and otherwise imperfectly farmed, amount of steam power employed, number of acres under lease or annual tenure, customs of valuation to incoming tenants, extent of irrigation, number and position of cottage residences, and other details, necessary to form sound conclusions as to the present condition of British Agriculture.

As there are, no doubt, several in this meeting, who may hereafter desire to enter upon British Agriculture, I think it will be useful to lay bare its internal economy in a popular and simple form, unincumbered with tedious details. Farming, although a most agreeable occupation, is notoriously a slow business, attended with small profits.

Fortunately it is so, otherwise our towns and cities would be comparatively deserted.

Yet, how desirable it is, that the surplus profits of trade, commerce, and manufactures, should flow into the lap of poorer Ceres, to develope her powers and increase her riches.

One thing is quite certain, that if high farming is slow, unimproved farming is ruinous.

ARITHMETICAL ANALYSIS OF THE ECONOMY OF FARMING.

There is nothing more difficult than to obtain from farmers a statistical detail of the cost and return of the various branches of their occupation.

Comparatively few keep books—nor do they appear to have considered it necessary to investigate details. (By-the-by, I know a great many tradesmen who have much to revise in this respect.)

FARMING CAPITAL.

I may, perhaps, be permitted to say, generally, that to farm 400 acres of land you should have at least £5000, or £12 per acre: but if you are to carry out subterranean irrigation, and all the modern improvements, you will want £6000 to £7000, irrespective of landlords' improvements, for building, drainage, &c.

You will then be in a condition to avail yourself of opportunities to buy, when you see anything cheap, and to sell when things are dear. I assume that you have judgment and a thorough knowledge of your business in all its details; for, unless by yourself or others acting for you, the most is made of everything, you must expect to lose your capital.

There always are, in every market, men of extraordinary powers, ready to absorb the injudicious or uninformed.

Look at my own live stock account—if five per cent. mistake were made in buying and selling it would derange my balance sheet to the extent of £250.

FARM PROFITS.

As a general rule, ten per cent. on the capital invested is considered a very good profit in farming. There are thousands who do not realise half of it; here and there a man of extraordinary powers and great personal economy accumulates a large fortune—but it is the exception, not the rule.

A return of four rents per acre is generally considered satisfactory—the average of the kingdom is, I think, less. In cases of improved farms it is sometimes five rents, or more.

The necessity for diminishing the fixed expence, by an increased produce, is illustrated by the statement of a first-rate North-country farmer, who says, that if he spends £1 per acre, or £600 a year for artificial manures he makes a profit; if he omits it he makes a loss.

If stock is too dear, or you are short of capital, plough in green and root crops—particularly on heavy land.

DISPOSAL OF CAPITAL.

As a general rule, your capital will be absorbed as follows:—

Valuation	£2	10	0	
Live stock	2	0	0	to £6
Implements	1	0	0	
Labour	1	15	0	to £2 5s
Seed	0	10	0	
Tradesmen's bills	0	5	0	
Rent	1	10	0	
Poor rates, tithes, &c.	0	10	0	
Artificial manure	1	0	0	
Farm horses	1	0	0	
Personal expenditure				
	£12	0	0	

Farmers have generally the advantage of house rent free, although too many of our farmeries are entirely unfit for a tenant of capital and intelligence, who will seldom enter upon such occupations.

Supposing we take a farm of four hundred acres, on the four-course or mixed husbandry system, we shall find that one-half the farm produces nothing in the way of profit, but, on the contrary, leaves a considerable charge against, or upon the remaining half which is in corn. For instance, the horses consume one quarter of the farm, the sheep and cattle consume the other quarter; and you will find, if you give your live stock much oil-cake or corn, that the whole of the expences of one-half the farm have to be paid by the other half, which is in corn—and whether that corn is at 40s. or 80s. per quarter make a very serious difference to the occupier:—

EXAMPLE.

400 acres (minus fences, buildings, roads, and waste, for which the tenant always pays rent) really 380 acres.

50	acres in clover
30	acres in beans
20	acres in pasture
40	acres in tares, rye grass, &c.
50	acres in roots
100	acres in wheat
90	acres in barley and oats
380	

It follows then that your 190 acres of corn have to pay two rents; two tythes; two rates; two manual labours; two seedings; two tradesmen's bills; and merely make a polite bow to the other half of the farm for the manure left by the consumption of its crops.

Now, it seems very ungracious, that when you have grown a splendid crop of turnips, at an expense of £7 to £10 the acre, the sheep are to consume it, leaving you nothing but the price of the hay and cake you gave them with it; but it is a system that cannot be avoided until you find some cheaper sources of manure.

The man who does not feed off his green crops, but attempts to steal extra crops of corn, soon impoverishes the land and himself too. All our most successful farmers are large purchasers of cake and artificial manure.

But if manure is so costly to produce, how important is it that not one drop or atom of it should be wasted! or allowed to run down the ditches and road-sides with every shower.

Amongst the evidences of enlightenment and improvement of the present day, is the introduction of covered homestalls or farm-yards, where the animals and manure are both sheltered from adverse weather.

This is one of the paying moves in agriculture.

But to return to live stock; a reference to my balance sheet will confirm what I have stated.

After paying for purchased food, shelter and attendance, the sheep and bullocks left a mere nothing for the cost of producing some seventy acres of fine roots and green crops. Owing to my system of managing live stock, I never have disease, but when I find Insurance Companies charging 20 per cent. for insuring animals, it is an evidence of ruinous mismanagement, and would form a charge on my farm of £200 per annum.

In pastoral and dairy and cheese districts, where a suitable soil and climate combine to produce a natural fertility, live stock may be reared, or sustained with advantage on the natural produce; and I believe in parts of Scotland the turnip is produced more cheaply and nutritiously than elsewhere, owing to the climate; but my remarks will apply to a great portion of this kingdom, especially where the rainfall is under twenty-six inches, and the climate dry and suitable for cereals—as on the Eastern and South Eastern coasts. In such districts, the retention of poor worthless pastures is a great mistake, and they should give way to a mixed husbandry.

On the subject of live stock, I once asked a Lincolnshire farmer, who consumed £500 worth of cake annually, how he charged it.—"Oh!" said he, "I charge half to the bullocks and half to the manure."

As a general rule, when we are buying sheep for fattening, we pay one penny per pound more for them than we could realise for the same weight when fat.

This is the penalty we have to pay to the breeder, who has to provide the bone and offal in the animal.

Breeding is not all profit, for it robs the corn side of the farm, unless much purchased food and manure is used to restore the balance; but to return to my 400 acre farm.

Now I have no doubt this statement will startle many a practical farmer, and will raise a storm of indignation amongst stock feeders and stock breeders, but the naked truth is best told, which is "that live stock are necessary evils, mere manufacturers of manure, and unattended with any direct profit."

That if you give them cake and hay while feeding off your turnips and green crops, the return for these green and root crops will be "nil," and their cost must be charged to the corn crops against the manure.

I am firm in this opinion, not only from my own extensive stock feeding, but from an extended observation, as well as by the undeniable proofs recorded by Mr. Lawes in the *Royal Agricultural Society's Journal.*

It is a want of this knowledge or belief that leads to so much vexation and disappointment.

I remember receiving an inquiry from a novice on farming how much the bullocks should leave for his roots and hay. I told him if he gave them much cake he would get nothing for his roots, and about two-thirds the marked value of his hay. He evidently was not prepared for this, and suspected foul play. He has since retired from farming in disgust.

Another correspondent wrote to state he was about to prepare for the accommodation and feeding of a large number of pigs, as a matter of profit. I told him the only profit he would get would be the manure, which would cost him a loss of ten to twenty per cent., including attendance, casualties, &c.

Of course, he thanked me, and gave up all idea of making a fortune by pig feeding. The same remark applies with increased force to poultry, which should only be in sufficient number to consume the waste corn.

Now there is nothing loses so little as a pig, because he makes a quick return, and you get paid meat price for his skin, which is not the case with other animals; his offal is also valuable.

I find, with a very extensive practice, that with fine heavy barley at 30s. per quarter, and pork at 6d. per lb. net, pigs will "clear their teeth," or pay for their food, leaving attendance, housing, and casualties, as a charge against the manure. This agrees with the Suffolk saying that a bushel of barley, 56lbs., will make a stone of pork (8lbs.).

For fattening pigs nothing beats one-third pea-meal, two-thirds barley-meal, and some milk, if you have a dairy.

I am particular in enlarging and insisting on this important question in agriculture, because there is much mistaken opinion about it; and even the editor of the best Scotch agricultural periodical (*The North British Agriculturist*) will continue to assert that live stock will pay, irrespective of manure.

AGRICULTURAL VICISSITUDES.

Three years ago, when I had the honour of addressing you, wheat was at 38s. per quarter, and agriculture gloomy and desponding. Now wheat is at 78s. per quarter, with an abundant harvest, and agriculturists happy. Those who will refer to my predictions at that period will admit that I was a true prophet.

I will not detain this meeting with details, but will refer you to "Norfolk Agriculture," by Bacon, a most valuable book, where you will see many honest farming balance-sheets, exhibiting all the phases of agricultural prosperity and adversity. You will there see (page 99 and 100) a difference of £1000 between a "good year" and a "bad one."

It is precisely these strange agricultural vicissitudes that should teach us wisdom. They always have occurred, and they always will occur.

A wise agriculturist will therefore, when things are palmy, put by a little to meet future difficulties, and not invest his happy balance in enlarged holdings, which may hereafter be a dead weight and loss in times of difficulty.

On a farm of 400 acres of highly farmed arable land, the discrepancy in price between the two periods would be enormous. Take the 200 acres in grain, the difference would be something like £1500.

If I were to advise you, I would say never take a farm that is not thoroughly drained, more particularly if of heavy clay, the alternative is one of profit or ruin. I know so many estates where I see the tenant's capital wasting away under the evil influence of undrained clay, that it is quite a painful consideration. I am preprared to prove that if a tenant will pay his landlord 5s. per acre extra, or 5 per cent. on £5 per acre drainage, the gain will, in various ways, far exceed the charge.

I will illustrate this:—a tenant of mine, at the expiration of his lease, appealed for a reduction of rent. I declined acceding to it—I said if I reduce your rent 5s. per acre, that will be the whole amount of your gain; but if I drain your strong clay four feet deep, at an expense of £5 per acre, it will, particularly in wet untoward seasons, increase your crop from eight to twelve bushels per acre, or in money from 20s. to £4 per acre. I saw by a certain expression of countenance, that he doubted the benefits of deep drainage in strong soils, but he said, "suppose we try one field." Well, we did try one field, the drains poured forth their volumes of water after rain, the surface was dry and easy to work, and the crop succeeded where it had always before failed; this led to the drainage of other fields, and then came a covered yard or shed, on the same terms. The result appears already—a property more valuable to the landlord, and more marketable—more remunerative to the tenant—and certainly more useful to the country at large. The neighbouring farmers watched the operation, which I believe was not without its influence on their proceedings and sentiments.

The farm was a small one of thirty-two acres; I had previously removed a five acre wood, and sixty great oak pollards.

The covered yard with feeding places and conveniences, cost £105, with slated roof.

Formerly it was farmed at a loss—now it will be profitable. There is something very distressing in seeing men full of hope taking unimproved farms, and plunging into destruction; they are "booked" by the knowing ones on their first entrance, with a "ah, poor fellow, a very few years on that nasty soil will settle him."

I may be asked—why I attach so much importance to drainage? Why you might as well ask me, why I attach importance to circulation, vital or monetary? Stagnated water, or stagnated air, are as ruinous to the plants as they would be to our own vitality. Fix a cork in the drainage hole of your flower-pot, and you will soon have a practical illustration of my meaning.

The sallow and bilious plant (like many turnip crops I know of on undrained land) will shew by their expression what is denied to them in speech.

This is not the occasion to enter into a subterranean examination of gravity, capillary attraction, aeration, or filtration, much less of all those affectionate or repulsive inter- changes, that turn air, water, and earth, into food for man or beast; but be assured, circulation is vitality—stagnation death and ruin.

It has often been asked of me, by townsmen, "why so few farmers become bankrupt?" and they are apt to infer from this that it is a very profitable occupation. The law does not prevent it, because the mere purchase and sale of a sheep in a market constitutes him a trader.

Let me explain it:—there are certain things of value *in* every farm which you cannot seize, and which will defy the powers of the most alert sheriff's officer. He cannot carry off the hoeings, ploughings, and drillings, vegetating seeds, juvenile plants, incorporated manures, and a score of other invisible things that constitute "a valuation," and which seldom amounts to less than two years' rent, or two pounds per acre—very often much more.

Farming is in England too much of a ready-money business. You walk into a market, and settle with the ready cash. But supposing you have a complaisant banker, there is no concealing the declining state of your exchequer; you cannot hide stacks in drawers, or make "dummy" bullocks and sheep; there is hardly a bumpkin in the village who cannot take your exact financial measure.

It is in vain that you plead, that the early disappearance of your stacks is because you want the straw.

No! the poor declining farmer has no chance of "making a pocket," or obtaining a bankrupt's allowance during the winding up of his affairs. The whole thing is simple and winds itself up—the unfortunate comes out pennyless, glad to take a bailiff's place at fifteen shillings to twenty shillings per week. I have been painfully reminded of the unprofitableness of farming, by the innumerable applications I have received for employment, from men who had farmed largely and deserved a better fate. I recently asked a valuer, how many farmers failed, and lost their capital—whether more than fifty out of one hundred did not do so? and he admitted that it was so.

I may be asked why is farming so unprofitable. I reply because it is unimproved, or because there is no valuation for improvements.

AGRICULTURAL POWER.

I lay down as a great axiom in agriculture, in the mere question of physical labour or power, independent of skill, that steam is cheaper than horse, and horse cheaper than man. A steam horse costs 1s. 6d. per day, and will do as much work as two real horses. A real horse costs 2s. per day (including harness, shoeing, etc.), and a farm labourer nearly the same. But as a good horse weighs 1600 lbs. and a man only 160 lbs. the power being as from eight or ten to one in favour of the horse, it follows that horse power is considerably the cheaper, probably (including the necessity for manual superintendence) as four to one.

This brings me to the fearful question—What portion of the acreage of this kingdom do farm horses consume? I answer, nearly one-fourth of all the arable land in the kingdom. In ordinary arable culture, where there is little permanent grass, it requires four farm horses to 100 acres. Each of these horses will consume on the average from five to six acres (landlord's measure, which includes hedges, roads, waste, farm buildings, &c.)

42 weeks . . . . 84 bushels oats
157 trusses hay, or 78½ cwt.
10 summer weeks (no corn) will clear 2½ acres clover.

This will be found to amount to 10s. per week, or £26 per annum, and will be the produce of about six acres at £4 10s., or four rents per acre. I speak, of course, of average land, rented at 20s. to 22s. 6d. per acre, ordinary farming. Many farmers give oats all the year round.

On very poor farming, like some I know of, ten acres would hardly keep a horse, whilst on very high farming (especially on the irrigation system), one or two acres would suffice. This brings us to consider the imperious necessity and advantage of forcing from the land its utmost possible development. If one acre will keep a horse there is only one rent, one tythe, one rate, one seeding, and so on; but all these are multiplied from five to ten times, by middling and bad farming.

Those who have watched the discrepant productions of three tons or fifty tons of green food per acre, can at once apply my observations.

But a great economy may be effected in horse-keep, by crushing the oats, cutting the green food, and mixing with it a proper proportion of straw, &c., instead of turning the horses out to trample down and defile their food.

On the whole, I think we may congratulate ourselves on a considerable advance; facility of intercourse and ventilation of the question by public meetings, remove, both on the part of landlord and tenant, many erroneous and antiquated prejudices.

In conclusion, permit me to state as a result of a very minute investigation of the facts, that there is ample scope for a noble future in our British agriculture; that the same principles apply to that as to all our other branches of national industry, that self-satisfaction and immovability are ruin, but that a rapid availment of science, capital, and amendment, is wealth and profit; even leaving out of consideration our higher duty as providers of the food and employment of the British people.

BALANCE SHEET.

Dr.

To Valuation, 31st October, 1853—	£	s.	d.			
Horses	74	0	0			
Pigs	255	6	0			
Sheep	448	0	0			
Cattle and Cows . .	239	10	0			
Implements . . .	390	12	0			
Tillages, Hay, &c. . .	471	18	9			
				£1879	6	9
Rent of Chapel Land				45	0	0
Tythes, Rates				75	0	0
Labour, including Engineer, Bailiff, &c.				450	0	0
Guano, Bones, & Superphosphate of Lime				100	0	0
Seed-Corn and Seeds				50	0	0
Live Stock bought				1619	0	6
Corn and Cake for feeding purposes, Horses' keep, &c				1021	10	9
Coals for Engine, Tradesmen's Bills, &c.				160	0	0
Interest on Irrigation Pipes, 7½ per cent.				55	0	0
				£5454	18	0
My Improved Rent, 36s. per Acre . . .	£240	0	0			
Profit	517	15	0			
				757	15	0
				£6212	13	0

Cr.

By Valuation, 31st October, 1854—	£	s.	d.			
Horses	140	0	0			
Pigs, &c.	131	14	0			
Sheep	555	2	0			
Cattle and Cows . .	189	10	0			
Implements . . .	390	12	0			
Tillages, Hay, &c. . .	542	6	7			
				£1949	4	7
Wheat, 4 Qrs. 6 Bu. ⅌ Acre, 70s.—50a.				831	5	0
Barley, 7 „ „ 35s.—16a.				196	0	0
Beans, 5 „ „ —13a.				100	16	0
Oats, 13 „ „ 28s.—12a.				218	8	0
Produce of Cows and Poultry . .				50	0	0
Hay Sold				—	—	
Horse Work, Labour, Hay, Manure, &c. for Private Establishment . . .				90	0	0
Live Stock and Wool Sold . . .				2576	19	5
200 tons of Mangel Wurzel, to be sold to London Cowkeepers, 20s. . . .				200	0	0
				£6212	13	0

LIVE STOCK ACCOUNT.

Cr.

	£	s.	d.
To Valuation, 1853	1016	16	0
Corn, Cake, and Feeding Stuffs bought .	1021	10	9
Live Stock bought (including 2 horses) .	1619	0	6
	£3657	7	3

Dr.

	£	s.	d.
By Valuation, 1854	1016	6	0
Live Stock and Wool sold . . .	2576	19	5
Loss independent of the Root and Green Crops consumed	64	11	10
	£3657	7	3

The quantity of green and root food consumed by the Stock is estimated as follows (this includes the keep of 6 farm horses):—

12 Acres of Mangel Wurzel.
6 Acres of Italian Rye Grass, well irrigated and five times cut or fed (a very heavy crop).
A good second growth of Clover, irrigated, about nine acres. A first growth on eight acres.
20 Acres of Tares and winter Oats.
16 Acres of good white Turnips and Swedes.
The Straw of the Farm.
5 Acres of Pasture.
Grinding Meal, Attendance, Interest for Shelter, &c., may be considered as a set-off against the Horse-keep.

DISCUSSION.

Mr. Samuel Sidney said, that the Smithfield Club Dinner would detain, until a very late hour of the evening, Mr. J. Hudson, of Norfolk, Mr. Jonas Webb, of Cambridgeshire, Mr. Fisher Hobbs, of Essex, and other agricultural improvers of the first-class, who had been invited to attend and take part in the very important discussion which had been introduced in so amusing a manner by Mr. Mechi. Under these circumstances, as he (Mr. Sidney) had made it his pleasure and his business for some years past to visit and gather the opinions of the best farmers in almost every county from Yorkshire to Devonshire, he should venture, in the most friendly spirit, to criticise Mr. Mechi's statements and opinions. But before doing this, he must put himself right with the meeting, by informing them that he was not, and never had been, a political opponent of Mr. Mechi —that he agreed with the broad, general principles that he laid down, although, fortified by the experience and the experiments of some of the first farmers of the day, he dissented widely from his agricultural recommendations. In the first place, Mr. Mechi had not done justice to the improving spirit of the farmers of England, by implication rather than by direct assertion. By his silence, in a paper on "British Agriculture," as to all doings except his own, he had led that *un*agricultural assembly to believe that an active improving agriculture was only to be found in his little farm in Essex. This was not the case. There was no doubt that well-drained land—appropriate farm-buildings—the best implements the agricultural mechanic could produce—a steam engine, fixed or locomotive—stock of good quality—the use of artificial manures and artificial food, were essential to developing to the utmost the food-producing capabilities of the kingdom. This every modern farmer acknowledged. Why, as to drainage it was no new thing; it had been practised in Essex and Norfolk years ago, as could be confirmed by a Norfolk farmer now at his side, of forty years' experience. For many years the "Journal of the Royal Agricultural Society," and the discussions at Farmers' Clubs, had been directed to the subject; and wherever he went, whether for farming or for hunting, he found the ground drained, or in process of being drained, by landowners and tenants, without reference to proceedings at Tiptree. Four or five draining companies were fully occupied; the Government Draining Loan was eagerly taken up from North to South; there was no show of supineness. The same remark applied to farm buildings. In Lincolnshire, in Norfolk, in Bedfordshire, and in Essex, excellent farm buildings had long existed. They were being erected in every county of England. In Devonshire, the Duke of Bedford was doing great things; in Herefordshire and Worcestershire improved buildings had been erected by Mr. Oakley, who was in the room; and by Mr. Beadel, in Essex; while the buildings in Bedfordshire left nothing to be desired. But none of these buildings were on the model, or planned on the principles, of Mr. Mechi's. As to steam-engines, they were not new; in Scotland they were as common as barns; and long before Mr. Mechi erected his, their construction was an established branch of trade with half-a-dozen agricultural implement makers. The enormous, the constantly increasing, demand for the most improved implements by real farmers, showed that our agriculturists were awake and up to the spirit of the times. As to stock, he preferred Mr. Mechi's advice to his example. He had seen his stock, and compared it with that he saw tied up feeding on Lincolnshire and Bedfordshire farms, and he must say the comparison was not to the advantage of Mr. Mechi's system. They had heard something of the amount of meat sold off Mr. Mechi's farm; why he could tell those who now looked into farming details for the first time, of Mr. Hudson's farm of 2000 acres, where, besides enormous corn crops, he sent off to the London market 10 fat bullocks and from 200 to 250 fat sheep every week, from January to July, where the bill for oil cake was 600*l.* or more, and this on the same which in 1822 would only carry in the year two hundred farm beasts and two hundred and fifty sheep. The owner of that farm had been farming more than thirty years, and had been improving every year of that time. He could tell them, too, of a farm in Bedfordshire where on no remarkable soil a thousand sheep and lambs and a hundred and fifty bullocks were sent off to market out of nine hundred acres; and these were specimens of modern and successful farming principles, which for many years had been making constantly-increasing progress without any reference or benefit from the little farm in Essex. He made these observations in justice to a most deserving, industrious, intelligent body of men, who were doing their duty in their calling. It was unfair to compare farmers to shopkeepers and manufacturers. The profits of a farmer were limited to one return in the year,—his occupation required his personal attention. In an hour the inhabitants of a town could receive all the advantages of such meetings as those of the Society of Arts. The farmer, from his local position, was deprived of the same benefit of discussion, comparison, and competition to be obtained by a town population. The value of land must always be limited by the extent of its markets. But he maintained confidently that the progress of agriculture had kept pace with the improved means of communication. On Mr. Mechi's balance-sheet he did not mean to make any remarks, although on a fitting occasion it might give rise to many inquiries. He hoped that Mr. Mechi would every year report to that Society the results of his many experiments, and give it the benefit of his shrewd and wily observations. But a balance-sheet, whether of a farm or a railway, was not the sort of thing to be discussed with any advantage by a public meeting. Mr. Mechi had been very unfairly worried into producing it, but he might now with a good grace discontinue it; especially as a favourable or unfavourable balance proved nothing on an experimental farm. At present prices every kind of industrious cultivation paid, or ought to pay. In conclusion, he would say a few words on the only subjects in Mr. Mechi's paper which raised any disputed points—steam digging and liquid *versus* solid manure. Steam digging might be dismissed in a sentence—it had nothing to do with British agriculture—it was a mere theory, very proper for the investigation of mechanics, but no working digger had yet been produced. So far the plough was the best instrument, and the efforts of agricultural reformers would be most usefully directed to inducing our farmers in dark districts to adopt the improved iron ploughs of Howard and of Ransome, instead of their clumsy wooden affairs, without waiting for the invention of a steam digger. As to the liquid manure, there were, no doubt, circumstances under which it might be used with great advantage, but the balance of evidence was against its exclusive employment for every kind of crop. The use of it was twofold, mechanical and chemical. Solid long straw manure was invaluable as a disintegrator of heavy clays. It had another advantage: when once laid in the soil, the labour was done; thenceforth it gradually and surely gave forth its fertility to every crop. But the crops of a farm were, at any rate, of three kinds: root crops, corn crops, and grass crops. The whole balance of experiments tried in every part of England showed that liquid manure was not more advantageous or economical, and sometimes positively injurious to root crops. To corn crops it was positively injurious, stimulating the straw at the expense of the ear, and washing away the soil from the roots. On grass crops the results, when applied in sufficient quantities, and at proper times, were very satisfactory, especially on the perennial Italian Rye-grass. It would depend on circumstances whether green crops should be the chief object of cultivation. But, at any rate, young farmers must pause before they altered the whole economy of their farm, went to enormous expense in iron pipes, hose, labourers, and coal for pumping, and incurred the difficulty of building great tanks for a manure available for only one kind of crop.

At present the whole current of opinion was towards covered homesteads and feeding in boxes, for the purpose of producing solid concentrated manure. That plan was rapidly superseding open yards, and that was the very reverse of tanks, pipes, pumps, and squirts. The most effectual application of liquid manure he had ever seen was in the Water Meadows of Ersmoor, where a stream, carried through the farm-yard of Mr. Robert Smith, was impregnated with a dung heap, and on rainy days eighty acres were flooded in an hour. By this means land not worth 2s. was made worth 40s. a year, but that depended on local peculiarities, as to form of land and flow of water. He (Mr. Sidney) deprecated the hasty adoption of the enormous expenses attendant on applying liquid manure to farms where dairy produce was not the principal object. As to town sewage, that was quite a different question ; it would, he hoped, be shortly discussed separately at the Society of Arts. He would not enter into any elaborate details as to the sewage question, which had been exhausted in a recent paper by Mr. Way, the consulting chemist of the Royal Agricultural Society. Sewage manure was not night soil—it was a very weak solution, the solid matter floating in 1,400 times its weight in water. Night-soil was largely used by our market gardeners, who brought it back from towns in their carts when they sold their vegetables. London manure could be sent down the Medway to Kent for 1s. 6d. a ton. But the Chinese plan of collecting soil from house to house would not pay here. There wages were a penny, here they were 3s. a-day. For his part he said, let those who could use town sewage and nightsoil, but do not let the towns wait for a profit from nuisances, when farmers can more cheaply send thousands of miles for guano. In conclusion, he begged to thank Mr. Mechi for having opened so important a subject as British Agriculture, and to recommend those who were inclined to commence the study not to be satisfied with books and lectures, but to visit our best counties. From long acquaintance with farmers he would promise them a hospitable reception from a body of men not inferior, having regard to their opportunities, in intelligence and enterprise to any class of men in the kingdom.

Mr. **Moore** spoke in favour of the application of the sewage of towns to the purposes of agriculture, and gave his opinion that it was perfectly practicable to be carried out.

Mr. **Oakley** said, he was not aware that he should be called upon to express his own views upon this subject, but having been invited to do so, he would say, in the first place, he thought the farmers of this country had a great deal to thank Mr. Mechi for—not only for the good he had accomplished, and the money he had spent in effecting improvements, but also for having pointed out to the agriculturist the shoals and breakers which he should steer clear of. From what had fallen in the course of this discussion, it appeared to him that the principal question was that of economy in the application of manure, and he thought there was no matter more worthy the attention of the farmer than that. As far as his own experience went, he would say the best economy of manure, and the cheapest way to make it available and profitable was to make it under cover, and to keep the rain of heaven from it, in order that the real manure might go into the land in that state; and if that was done, the manure so used had been proved to have a stronger fertilising power than manure made in the open air. Believing that to be the case, he had adopted the system of box feeding, which he first saw in practice on the farm of Mr. Beadel, in Essex. He saw the system in operation there, and took an opportunity to introduce what he considered some improvements, and those persons who had adopted the plan had thanked him over and over again for having called their attention to it, and had acknowledged the great advantages resulting from it. He was happy to tell them that it had been proved beyond doubt that the same area of land, covered with buildings—be they stables, barns, cattle-sheds, or piggeries—could be closed under one roof at less expense than upon the old plan, leaving as much stable and yard room as under the old system. If that were so the landlord was benefited by the buildings costing him less; and he was, moreover, benefited, because the tenant would thrive better upon the manure which he made. He could not sit down without again expressing how much they were indebted to Mr. Mechi for the public way in which he had come forward; and he (Mr. Oakley) would assert, without fear of contradiction, that the agricultural world would unite in acknowledging that it was greatly indebted to Mr. Mechi for the ingenuous manner in which all his communications had been made. One word with regard to the balance-sheet. He agreed with Mr. Sidney that the production of figures before an assembly was of very little avail ; it was of little use to show a credit of so much to Michaelmas 1853, inasmuch as figures might be made to look well on paper. At the same time he (Mr. Oakley) was quite satisfied that it was not the intention of Mr. Sidney to cast any imputation on the accuracy of the balance-sheet any more than they would discredit any of the other statements which Mr. Mechi had so ably laid before them.

Mr. **Davis** said he concurred in the adage that " Blessed is the man that makes two blades of grass to grow where only one grew before ;" and he thought Mr. Mechi had very materially contributed towards making not only two blades, but four blades of grass to grow where only one grew before. With reference to the cultivation of Italian rye grass, Mr. Sidney had referred to the opinion of Mr. Skirving, that the most preferable form of manure for that crop was guano mixed with water ; but Mr. Sidney had not told them the proportions of each, though any one who knew anything of the subject would admit that the quantity of water must be very large. Mr. Sidney appeared to laugh at the introduction of steam-engines for the purposes of agriculture. (Mr. Sidney—No, no.) He spoke of the expense of steam-power. (No, no.) He (Mr. Davis) maintained that by no system could irrigation be so effectually carried out as by means of pipes, and the steam-engine, as introduced by Mr. Kennedy, of Ayr, except where they had water-power adequate for the purpose. The cost of steam-power was, in his opinion, infinitesimal as compared with its value in farming operations. He had the statistics of an experiment upon a small scale in Scotland. There were 15 acres of Italian rye grass sown in 1853, and 25 acres sown in 1854, also 15 acres of ordinary grass. The latter was very badly treated, inasmuch as there was not a sufficiency of liquid manure either for that or the Italian rye grass, owing to the tanks not being completed, so as to save the sewage of the winter of 1853. The Italian rye grass of 1854 was sown between the 17th April and 1st of May, and yielded four good cuttings. There were also four cuttings from the ordinary grass, and four from the Italian rye grass, sown in 1853. Upon these 55 acres of grass there were put on, 8th of May 1854, twenty-five cattle, all sold by the end of September ; on the 18th of May, twenty cattle, and on the 22nd of June, eleven cattle, all sold by the end of October ; and sixty-eight cattle, rising two-years old, which had been put out between the 26th of June and the 19th of July, were on hand at the end of October. He would mention that the cattle were fed in covered yards, and out of 124 cattle, 260 sheep, and 15 pigs, put on between the 24th of April and the 11th of October, not one case of death occurred, and practical farmers who heard that would say it was very good. These fifty-five acres fed at the rate of two head of cattle and five sheep per acre, and that was in a poor county, where, in general, they would be glad to fatten one beast upon two or three acres of land. As to the profit, without laying a balance sheet before them, he would give them the figures. The net profit, after deducting all expenses for labour, horsework, interest on outlay for buildings and machinery, wear and tear, interest of money on stock, cost of cake and corn, and all other charges, was 4*l.* 6*s.* 10¾*d.* per acre, or, on fifty-five acres, 238*l.* 19*s.* 4*d.*, that was the result of the application of capital and skill upon very bad land. He had been induced to make this statement in consequence of what had been said as to there being no profit got out of feeding cattle upon rye grass. They need not go to foreign countries for guano, when they had enough at home of excellent quality if they would only put it upon their land, but as to watering-carts and hand-barrows they were child's play. It was like asking the cotton manufacturers to take up the distaff again. (Hear, hear.) He looked upon the steam engine and the pipes as the spinning-jenny and the self-acting mule of agriculture. As Mr. Mechi has justly remarked, it was circulation they wanted. As long as they stayed at home hugging their own notions, they thought themselves very clever, but when they went abroad they very soon found there were others more clever than themselves. Why, a manufacturer in Manchester would not hesitate to go to Switzerland, if he found out that some one there could dye cloth a better red than he could produce it, but it was difficult to get the farmer to go into the next town. No; he would stop at home—his father was a farmer before him, and therefore, he ought to know a good deal about it. (Laughter.) He felt convinced that if farmers would think and consider, they would learn a great deal more abroad than they did by staying at home. With respect to Mr. Mechi, he (Mr. Davis) begged to add his testimony, that there was no one to whom the farmers of this country were more indebted than to that gentleman. He had endeavoured to make farming a trade, and he was happy to say it had become a trade instead of a mere vehicle for the exercise of political influence. He would say in conclusion—give the farmer a good tenure of his land—let the landlord effect the permanent improvements which the tenant ought not to be subjected to, and then they would have meat cheaper and corn cheaper; the people would be happier and the nation at large more contented.

Mr. James Caird had no intention of obtruding himself upon the meeting, and would have been happy to have given way to such gentlemen as Mr. Hudson and Mr. Fisher Hobbs, had they been present. He had very little to say upon the subject further than that he agreed with, he believed, every one present, in acknowledging that all Mr. Mechi's exertions had been productive of great advantages; and on every occasion he had told them the result of his experience, whether favourable or otherwise, with the greatest candour. He agreed with Mr. Oakley that Mr. Mechi's experience had been of that description which had guided others from the shoals which he himself had encountered; and they were therefore not the less indebted to him for his friendly warning. He thought there was some little misapprehension, but no real difference, between Mr. Mechi and Mr. Sidney. The latter gentleman had given a correct history of the improved methods of agriculture which were now in operation throughout the country; but Mr. Mechi had come forward to speak of his own experience, and not the experience of others. It was no slur upon that gentleman that he did not tell them what other eminent men had done. He would ask any practical man present whether the instance which Mr. Sidney had given of sending from a farm in Norfolk 10 fat bullocks and 250 fat sheep per week into the market was not an exception? Would any one say it was the rule? But the observations both of Mr. Sidney and Mr. Mechi tended to the same direction of progress, and they were equally indebted to both gentlemen for this expression of their opinion. There was, in reality, no difference of opinion; but merely in the way in which they had stated it. With regard to liquid manure, he agreed with Mr. Sidney, it was a question of profit to each individual farmer. Some would doubtless find Mr. Mechi's plan most advantageous, whilst others, differently situated in matters which must come into the calculation, might find the application of solid manure the most advisable. It was a question which must be decided by the peculiarities of each case.

Mr. Morton wished to say a word or two on one or two of the points to which Mr. Mechi had referred; and also on the value of his example generally to the progress of British Agriculture. There were no two more important points in the whole range of agricultural subjects than the economy of labour, on the one hand, which Mr. Mechi touched upon when saying that one quarter of the arable produce of this country was consumed by farm horses, and on the other, the profitableness of feeding stock, which he denied. Now he (Mr. Morton) was quite sure that the agricultural experience of the northern half of the island was against Mr. Mechi on both these points. Horses did not consume one-fourth of the arable produce of North Britain; nor were sheep and cattle necessary evils on the arable land of Scotland. They were necessary there as they were here, but they were profitable there, whether they were here or not. On the question of home labour, he might say that there were, last year, on the 250,000 arable acres of Roxburghshire and Haddington, 9,400 horses—a pair to every 54 acres; while over the 1,630,000 arable acres of Norfolk and Hunts there were 73,000 horses, or a pair to every 44 acres. Now it did not need 5½ acres in the South of England to feed a horse, and he was quite sure it did not need 6¾ acres in the Lothians to feed a horse. The question of horse-labour was a most important one, whether in a strictly agricultural or a national point of view; but he believed Mr. Mechi's statement exceeded what was in itself, without exaggeration, a sufficiently startling truth. How far the horse population of this country might be diminished by a skilful arrangement and economising of labour—for *that* was the great merit of Scottish agriculture—would be obvious to every one who studied the agriculture of the two countries; and notwithstanding that it was rather in the diminished employment of *manual* labour that the agriculture of Scotland differed from that of England, yet to say that the farm horse consumes a quarter of the food his labour produces was an exaggeration in both North and South, which he would be inclined to put at nearly once and-a-half the truth in England, and as nearly twice the truth in Scotland. Then, as to the practice of feeding stock for the sake of the manure, he believed that his experience would pretty nearly bear out what Mr. Mechi said was his own; but, notwithstanding that, he should not venture to found upon it a general assertion, in the expectation that it would apply with truth to the whole of the country. He found that during four years, with £1,500 worth of stock a-year, he sold more fat beef, mutton, and bacon, than he bought of cattle, sheep, and pigs, and food and attendance, by £160 a-year—this then was the sum he received for the green food, at least 1,000 tons, which during each year they consumed—this was the sum out of which he had to pay the rent and cultivation of the 60 acres on which those 1,000 tons were grown. Well, that was not a very paying concern, but still it was a little better than the loss of £64 on £3,600 worth of stock and food, which was Mr. Mechi's position during this past year. In the former case, about 3s. 6d. worth of meat was made by the consumption of a ton of green food, and of course green food could not be grown for 3s. 6d. per ton—not even on an ordinary grass field, and still less in the turnip field. But he believed, that when good judgment guided the purchaser or the breeder, and skilful management conducted the feeding process, that you might calculate on 1 lb. of meat for every 175 to 200 lbs. of English-grown turnips; and he believed you might expect one-third to one-half more from the consumption of Scotch-grown turnips—there was all that difference in the feeding quality of the food. This amounted to 5s. or 6s. a ton for green food in England, and 7s. to 9s. a ton for green food in Scotland, at which prices, taking roots and grass together, it could be grown. There was all this difference as the result of differences of climate in the two countries: and under such variable agricultural conditions, he submitted that general sweeping assertions, however, calculated to stir up attention, were not *possibly* applicable to the agriculture of the whole of so variable a country as Great Britain. He should like to add a word or two about the value of Mr. Mechi's example amongst farmers. He believed it to be very considerable, but in an indirect rather than a direct way. As he himself had told us, it was a great point "to provoke people to talk about such matters, causing a little wonder, disbelief, anger, and ultimate calculation and conviction." And all this Mr. Mechi had effected so as no other man could, for no other man, he believed, possessed such exuberance of good nature, or could stand the badgering which had been his lot, and was the lot of all enthusiastic teachers, especially if they carried on the learning and the teaching together, which had been Mr. Mechi's plan, or, at least, had been his plan, in the earlier years of his agricultural history. The so-called failures which he experienced at first were not forgotten yet, as was found at the meeting of the Farmers' Club last night. But his honesty in relating his experience, whatever it might be, was one of the most useful points in his character as a teacher. It seemed that people had yet to learn that in a fully recorded experiment the word "failure" was altogether a misnomer. Let all the circumstances, from the beginning to the end, from the first outlay to the "balance sheet"—from the first operation to the full weight and measure of the result—be recorded; and, let that result be what it might, it could not be a failure. An experiment was just a question put to Nature, and the answer *no* was often as useful and as valuable as the answer *yes*. He hoped, therefore, that whether his experience were a warning or a guide, whether its information were negative or affirmative, Mr. Mechi would continue, as he had done, to give it to the public; and then, whether he were considered the best of farmers or not, he would certainly continue to be one of the most useful men in the agricultural world.

Colonel Challoner said he had listened with attention and with very great pleasure both to the paper and to the discussion which had followed upon its reading; and he believed every one who had listened to what had passed would go out of that room a wiser man than when he came in. He thought they were very much indebted to Mr. Mechi for the way in which he had brought forward the results of his farming operations. He had watched his address throughout, and he could not detect one single point in which he wished any person against their will to try the same as he had done. He had given them the plain facts of what he had done. He was very glad to hear two gentlemen like Mr. Oakley and Mr. Davis take part in the discussion, because the latter especially confirmed a great deal of what Mr. Mechi had brought forward; and therefore he (Col. Challoner) would say that the time had arrived when they were not to laugh at things because they came from a gentleman who had for so many years courteously, and, he might say, upon such public grounds, and at his own expense, endeavoured to throw some light upon the science of agriculture, and in which he had succeeded in an eminent degree. Mr. Mechi did not ask a single individual to adopt his plan, and there was no one in the present assemblage more qualified to give an opinion upon that plan than was the gentleman who presided over them that evening, and especially upon the relative values of liquid and solid manures; and he hoped the hon. gentleman would favour the meeting with his opinion on that subject. They had heard a great deal from Mr. Sidney—part of which he agreed with, whilst from other parts he must take the liberty of dissenting. One gentleman had said he should like to have a farm-yard entirely covered in. As far as his own little experience went, he should certainly like to have every animal under cover; but he should be sorry to run the risk of any inattention on the part of his farm-bailiff to have the yard entirely covered over, except so far as the cattle was fed in Warne's boxes, where the urine ran in such proportion as to keep the manure in a proper state. He could mention an instance of a yard being covered over, and he had seen the manure turned out in the month of March absolutely with a dry blue heat upon it. No one could say that was in a proper state to be used upon the land. As a general rule, he did not think farm-yards entirely covered in were very desirable. He would now perform the pleasing task which had been assigned him, of proposing that the thanks of this meeting be given to Mr. Mechi, not only for his lucid and interesting paper, but in the name of the farmers of this country, for the expense, pains, and trouble he had been at to throw some light upon the science of farming.

Mr. Wren Hoskyns, on rising to second Col. Challoner's proposal to the meeting, said it was difficult not to feel the application of the old motto,—"Quot hominum tot sententiæ," to the wide field of opinion as well as experiment that the topics of agriculture had presented that evening. So infinitely various were the conditions of climate, soil, and season; so different, and often conflicting, the circumstances under which agricultural experiment was made; so many and various the sciences, and even the faculties of mind called into play, that the difficulty of arriving at absolute conclusions was preceded by the more embarrassing one to a speaker, of selecting one topic out of so many. "British Agriculture" was a wide field. Having, however, been requested to say a few words, he would address them on what appeared the more prominent topic of the evening's discussion, and indeed of very general discussion in all parts of the country—the application of sewage manure. Should it be applied in a liquid or in a dry condition? This seemed to him a most important and preliminary question. Were we employed upon the right problem in attempting its carriage and distribution, diluted with so enormous and costly a bulk of water, in a climate already so moist, and occasioning us so much labour and pains to part with our surplus fluid by drainage; or, was the truer and more economical problem, how to obtain the fertilising matter in its most condensed and solid form? He confessed the latter was the view to which he had been led, both by the results of his own experience and by that of others, whose opinions and experiments had been very convincing to his mind. He could not help indulging the belief, that if it were possible for all the fertilizing matter produced or brought upon a farm, to be equally spread over it in its dry and "fixed" condition, we might trust to the abundant precipitation of moisture in this climate to dissolve and dilute it amply for the wants of the soil. Such, too, was the conclusion arrived at upon Mr. Huxtable's farms, which he had revisited only last week, and which had presented to him a strong instance of the abandonment of the "liquid" system. There the tanks had become receptacles for burnt soil, saw-dust, and pulverulent matter of every kind, to imbibe and solidify the liquid outpour of the farm-yard and buildings; and such he (Mr. Hoskyns) believed to be the most profitable and convenient mode of its application; in the form, in short, of drill manure. He must, he supposed, add a word upon the subject of the steam-engine as applied to agricultural purposes; on which, while he cordially agreed with part of what had fallen from a previous speaker (Mr. Sidney), he could not accept his assertion, that the subject of its future application and cultivation was beyond the pale of practical discussion. Had such a rule been acted on in the other arts of life, where would have been all the advancement which had carried civilisation itself over the globe, by all the various operations to which the steam-engine had been, from time to time, and from invention to invention, newly applied? The practical difficulty which at present beset all the experiments towards this end with the steam-engine, was its own bulk and weight, increasing in equal ratio with its power, and thus appearing to refuse the twofold office of simultaneous cultivation and progression over the yielding surface of the field. But this, like other difficulties, might yet be overcome. Before sitting down, he must beg leave to second the proposition of Col. Challoner, and in so doing to express his gratification at the interesting paper read to them that evening by Mr. Mechi, whose undaunted pioneering had led to so much interesting and valuable discussion, and whose ready and eloquent call had awakened many a slumbering agricultural question, and whose good-natured advocacy, where it failed to make a convert, had never made an enemy. He begged to second the vote of thanks to Mr. Mechi, proposed by Col. Challoner.

The Chairman was sure he was only expressing the sentiments of all present, in saying that they were greatly obliged to Mr. Mechi for the very interesting and instructive paper he had read to them. From the little he knew of the duties of a chairman, he supposed they were rather to call the attention of the meeting to what appeared to be the chief point of interest in the discussion, than to express prominently his own individual opinions. He had, however, been so pointedly called upon by Colonel Challouer to give his views on one main subject of the evening, that he should trouble them with one or two remarks. Indeed, although a great variety of topics had been touched upon by Mr. Mechi and the gentlemen who had followed him, it was evident that the great question of interest had been, as to the comparative merit of applying manure in the dry or liquid form. When it was considered how large a sum was paid by the British farmer for foreign and for artificial manures, it certainly became his duty, as well as his interest, at least fully to inquire how far such a course was necessary. That was to say, whether any process could be adopted by which the manure of the farm could be more effectively and economically distributed on the land. Although the utility of the sewage of towns, and the methods of applying the manures of the farm, had been mixed up in the discussion, he thought it did not follow that the most economical mode of employing the one, must necessarily be so for the other also. The sewage of towns already existed almost entirely in a liquid form, whilst the manure of the farm was principally solid. If therefore the liquid form be the most practicable for the application of the sewage of towns, it did not follow that it would be the most profitable to convert the manures of the farm into the same condition. He was of opinion that where a large bulk of green produce was to be obtained within a limited area of land, the liquid form of manure would be the most effective. And if the sewage of London and other large towns were to be rendered available for agricultural purposes, he considered the most likely plan to effect it would be that of irrigation upon grass; irrigated manures acting, in his opinion, much more successfully upon Italian rye grass, or common pasture, than upon any other crop. However, he agreed with the opinion expressed by Mr. Sidney, that this question between solid and irrigated manures, was entirely one of cost. He did not think that at the present moment sufficient experimental evidence was before them to prove the economy of converting the manures of the farm into the liquid form, and in that state distributing them over the land. He had much pleasure in putting the vote of thanks to Mr. Mechi to the meeting.

The vote of thanks having been accorded by general acclamation,

Mr. Mechi rose and said, he felt much gratified at the manner in which his exertions had been acknowledged. He was happy on public grounds to aid to the utmost of his power in promoting improvements in agriculture, and he hoped the meeting would not separate without believing that his own practice had proved that the application of manure in a liquid form to every kind of crop, cereal, bulbous, and leguminous, had been most profitable and advantageous, and using it in a liquid form had resulted in his being able to feed double the number of sheep, and to gain twice the number of quarters of wheat per acre to what he could do when he applied the manure in a solid form.

The Secretary announced that at the meeting of Wednesday, the 13th instant, the following paper would be read—"On the Growth and Expansion of our Foreign and Colonial Trade in Iron, and the Fiscal Obstacles to its Extension," by Mr. Harry Scrivenor.

CONSUMPTION OF SMOKE IN PARIS.

The following order has just been issued by the Prefect of Police of the Seine:—

"Whereas the smoke of factories where steam-engines are used gives rise to continual urgent complaints. And whereas this smoke obscures the atmosphere, enters into dwellings, blackens the outside of houses and public buildings, and produces great inconvenience and unhealthiness in the neighbourhood. And whereas it is important that such a state of things should be put a stop to, at a time especially when the City and the Government are making considerable sacrifices for the embellishment of Paris and its environs, and when so much attention is being given to the importance of the sanitary condition of dwellings, and the laying down better rules for the preservation of the public health. And whereas there are many known practical means of consuming the smoke produced by the combustion of coal in the furnaces of steam-engines, and experience has shown that these means can easily, and at a small expense, be applied to existing factories; and, besides, the employment of anthracite and coke is often economical, and produces but little smoke. And whereas steam-engines have only been allowed on condition of their not producing smoke to the injury of the neighbourhood, and besides the owners of such factories are bound by the terms of their licenses to comply with every condition which the Executive deems proper to prescribe, with a view to public health;

"It is ordered—

"That after six months from the date of this present order (*ordonnance*) the owners of factories employing steam-engines shall be bound to effectually consume the smoke produced in their furnaces, or to feed them with smokeless fuel, such as coke or wood."

LAW OF PARTNERSHIP.

Well-founded complaints prevail in the city regarding the present course of the Board of Trade with respect to applications for charters to carry out important public enterprises. The Government seem perplexed between two systems, and refuse to act, so that the business of the country, as far as it is connected with this question, is brought to a stand. The opponents of the prohibition against limited partnerships, by which the commercial classes of England are deprived of an advantage possessed by every other people, have constantly pointed to the granting of charters as a proof of the evil of that prohibition, since it centred in a Government Board the power of bestowing privileges which, under proper arrangements, should be equally open to all. The necessity of it, however, until an alteration of the law should be effected, was always admitted, inasmuch as it afforded the principal means of mitigating a restriction which would otherwise have nearly altogether prevented the development of the joint-stock system. It was therefore never expected that any manifestation of the growth of public opinion in favour of a broader principle would lead to a diminished use of this palliative provision; but that, on the contrary, every effort would be made, by giving it the widest application, to render the introduction of the impending change as easy as possible. This anticipation has been disappointed, and since the vote of the House of Commons towards the end of last session, condemning by a large majority the existing laws as too narrow, the Government have made them narrower by refusing, on the ground of the unsettled state of the question, to employ the means by which they were previously rendered endurable. It was a bad state of things when, in order to obtain a charter for any great undertaking, its practical promoters were compelled to forego their own businesslike opinions to conciliate the peculiar views that might happen to prevail for the time at a West-end board, but this was far preferable to being obliged to abandon their objects altogether. At the present moment the fatal results of the passive obstruction practised are incalculable, since the anxieties of the war have already created, among their worst consequences, an indisposition to attend to the introduction of new plans or inventions, although it is under such circumstances that they are most needed, not only for national service, but also to give buoyancy to the revenue.—From the Money Article in the *Times*, Dec. 2, 1854.

It is alleged that a method of supplying the serious want of a cheap material for paper has lately been brought to great perfection, the staple employed being the fibre of common flax. To be productive of good results, however, either to the manufacturers, the nation, or the Excise, it must be conducted on a large scale, by a public company, and, although persons of capital and ability are represented to be ready to engage in it immediately, they refuse, with the prudence of buisness men, to commit themselves to this or any analogous enterprise without a charter of limited liability. From the passive obstructiveness of the Board of Trade, such a charter, it appears, cannot be procured, and another is thus apparently added to the numerous cases of complaint that, whatever may now be the merits or urgency of an object, it must be abandoned, or at all events deferred until speculative times, when it may, perhaps, be turned to account in the usual fashion by some set of adventurers unfit to manage anything, and alike indifferent to all questions of liability limited or unlimited.—From the Money Article in the *Times*, Dec. 6th, 1854.

BRITISH METEOROLOGICAL SOCIETY.

At the last meeting of this society, Dr. Lee in the chair, the Rev. H. Gardiner, Rev. J. Woolley, Dr. Buist, Dr. G. F. Burder, Dr. Merryweather, Dr. Paine, T. Collis, F. W. Doggett, E. Hughes, W. Ingram, and R. C. Kemp, Esqs., were balloted for, and elected members.

The following paper was read—"On the Weather in connection with the Aphis Blight and Growth of Hops."

The author commenced by observing that he had been furnished with the monthly rain fall by Mr. Glaisher, from the Royal Society from the year 1787 to 1815, and from Greenwich from the year 1815 to the present time, together with Mr. Glaisher's table of temperatures for 79 years. On discussing these he deduced the following facts —When the fall of rain in or about the quarter ending September, previous to the growth of the crop, has been above the average—the quarters ending December and March following being comparatively dry—a short crop, arising from aphis blight, has been the result. Average or large crops have succeeded when the quarter of the year ending September has been dry, also when both the quarters ending September and December have been very wet.

The temperature of the summer quarter of the year in which the crop is grown will influence the quantity produced (with few exceptions). The small crops were grown in years which experienced cold summers, and, on the other hand, the large crops were produced in hot summers. Observations have been extended over the last 67 years, and on comparing the temperature of the summer of the years in which the twenty-two short crops were grown with that of the twenty-two largest crops, it will be seen that in the former instance the average growth was equal to £55,728, the temperature of the summer quarters averaged 0·9 below that of 79 years; and also the twenty-two years which produced the largest crops, averaged £211,909, the temperature of the summer quarter was 1·5 above the same average.

WROUGHT-IRON ORDNANCE.

In the *Times* of the 28th ult., there were two letters on this subject, one of them from Mr. Nasmyth, of Patricroft, the other from Mr. F. Henry F. Barisford, Victoria-square, both gentlemen advocating the introduction of wrought-iron ordnance. Mr. Nasymth says: "We continue to employ for our great ordnance a material (cast iron) which, on account of its inherent unfitness to withstand violent shocks and strains, has in every other case been discarded from use." He then adverts to his steam-hammer, as enabling ordnance of immense dimensions to be perfectly well fabricated; says: "that the strength of forged iron is to that of cast iron, as six to one;" that "it is simply the strength or tenacity of the material of a gun which limits the capability of it as to the distance and weight of the missile it is capable of discharging;" and adds: "It is well known to practical men that, besides the vast inferiority in strength of cast iron, its tenacity decreases in a rapid ratio with the increase of the massiveness of the object it is employed to form." Mr. Nasmyth also says that he has "spent the greater part of his life in most intimate connexion with the working of wrought iron on the greatest scale, and where that admirable material has to resist shocks and strains of the utmost violence, and having besides had the happiness to give to the world the most energetic agent mankind has ever possessed for the forging of great masses of wrought iron, I trust I may be permitted to speak on this subject with some degree of confidence." Mr. Nasmyth further asserts, that wrought-iron ordnance might easily be constructed of a size to throw shot or shells of two or three hundred weight.

Mr. Berkeley refers to a previous statement in the *Times* which condemned the use of wrought-iron ordnance on account of its insecurity; in the enlargement of its bore; of its liability to rapid heating; and its expense. Mr. Berkeley then relates facts which came under his own observation, and which render "Mr. Rockwell's opinion doubtful." Mr. Berkeley then states, that about five years ago a trial was made at Woolwich of a "hammered iron gun, constructed by Mr. William Morgan." "A nine-pounder, weighing less than 6 cwt., was forwarded to Woolwich to have its qualities tested, more particularly its durability and powers of resistance." Mr. Morgan had constructed the gun as light as it could well be, that it might be tried on the most disadvantageous terms for the gun. A brass nine-pounder weighs 13 cwt., so that the weight of Mr. Morgan's was less than half that of a brass field piece." The first trial sought was, that the gun should be burst on successive charges. * * Upon the first day's trial, the charge, powder, wads and shot, being progressively increased, the gun did not burst. On the second day's trial they did burst the gun—that is, it was ripped open about ten inches half-way up. The following were the results. * * Great durability of the gun; the absence of heat on its repeated discharge; the absence of enlargement of either muzzle or touch-hole. At the conclusion of the trial, the gun was found to be as smooth as it was at the commencement."

On the 30th ult., the *Times* also published a letter from Mr. James Eastwood, of the Railway Iron Works, Derby. This gentleman relates that he had constructed at Liverpool a wrought-iron gun, whith was said to have been for the United States frigate *Princeton*. This gun was proved at Liverpool in the year 1845, the piece being of the following dimensions:—

Length of bore . .	12 feet.
Diameter of bore . .	1 foot.
Weight of shot . .	214 pounds.

The gun was first proved with 45 pounds of powder, then for two rounds with 44 pounds, and it was double shotted; then for 30 rounds it was proved with 30 pounds of powder, and a single shot.

What has been published in the *Times* newspaper has of course been perused by the multitude of its readers, but as the correspondence in question is detached, it has seemed to call for a connected statement of its purport, and therefore the above abstract has been attempted.

It appears thereby that wrought-iron ordnance has already been manufactured, and has proved, on trial, to be free from the objections that have been made to it, excepting only in point of cost; what that might be remains a question. That a given weight of forged iron costs more than the same weight of cast iron is certain; but if, as Mr. Nasmyth says, wrought iron be of six times the strength of cast-iron, it is probable that a wrought-iron gun might be provided at even a less price than if of cast-iron.

Considerable percussion must necessarily have taken place in the forging of wrought iron, and it has been ascertained "that the best Swedish iron may, by hammering, be increased by about a seventh in strength."* The increase of strength by hammering is of importance for ordnance of other materials than iron, for "one of the mixtures of metal used in the Metal Mills (at Portsmouth) bore a weight of 5 tons 7 cwt. before it broke, though the best Swedish iron, so hardened by hammering, broke with seven tons and a half.†"

Excepting in permanent fortifications, the dead weight of artillery is an important consideration, both in the land service and on shipboard. It seems evident that the amount of armament of a navigable vessel rests on the *weight* of metal she can support; hence arose the introduction of carronades, which, on account of their shortness, were less ponderous than long guns of equal diameter. Carronades have, however, been of late rejected in our navy, perhaps without sufficient reason, seeing that the charge of powder allowed for them was much below that for a long gun of equal bore, although the strength of the carronade admitted of a full charge. Increase of weight militates against the use of the increased length of ordnance, so ably advocated by Mr. Bridges Adams, for it can hardly be conceived that the increase of distance to which a long gun will carry its missile, can compensate on shipboard for number or weight of shot. The same reasoning seems applicable to the land service; for, if I mistake not, army brass field-pieces, twelve-pounders, are the largest guns used in the field, and they require half-a-dozen stout horses to draw them. Usually, however, nine-pounders only are brought into the field. A fifty-six-pounder cast iron gun weighs 97 cwt., to which being added its carriage and a few charges of ammunition, would bring the total weight to about 116 cwt., requiring at least eighteen stout horses to draw the whole on tolerably good roads, at a rate of little more than two miles an hour. The great importance of diminishing the weight of ordnance is consequently evident both for land and sea service; so that, if by the use of wrought iron as a material for artillery we should be enabled to throw shot of half a hundred weight instead of a ball of twelve pounds, the advantage thus obtained over an enemy would be proportionably increased, though Mr. Nasmyth's ball of two or three hundred weight were not adopted.

What has hitherto appeared in regard to wrought iron ordnance does not specify a particular that cannot but considerably influence its strength, namely, the degree of rapidity and force with which the strokes of the hammer are given. Probably Mr. Nasmyth's experience and extraordinary habit of observation may have enabled him to decide this question without further experiment.

Mr. Nasmyth says that wrought iron may be rifled. The Lancaster ordnance is on the rifle principle, but is said often to miss aim. Why this should be seems inexplicable, since a chief merit of a rifle small arm gun is its accuracy of aim. Surely this defect in the Lancaster gun might easily be remedied.

Military operations, since the war commenced, have fully evinced the superior efficacy of large to small missiles, and that our power of annoying the enemy has been seriously checked by the dead weight of our ordnance. In the affair at Bomarsund our success was mainly attributable to the use on shore of thirty-two-pounder ship guns, but the weight of them called for extraordinary exertions to place them in position. On that occasion, the crews of vessels of war lent their powerful aid to drag up the artillery of their ships, and so they seem to have done in the Crimea; but if those guns had been of wrought-iron, and but a sixth part of the weight of cast-iron guns—it seems needless to say—six times the number of guns might have been brought up with the same expenditure of manual labour.

Many are the impediments to a speedy introduction of improvements, some of them political; for example, when in the last century the Inspector-General of Naval Works urged General Ross to furnish *shells* for the *Arrow* and *Dart*, the General observed, that this destructive missile was, in naval warfare, as yet unused by the enemy, and that it would be impolitic to show him the efficiency of shells. But there can be no political motive for retarding the introduction of wrought-iron ordnance; on the contrary, it would seem good policy to hasten trials of this improvement, lest the enemy should forestall us. Russia possesses Nasmyth's steam-hammer, iron of a quality equal to the best Swedish, and a manufactory at Toula accustomed to its manipulation. Nor does the Russian Government seem so backward in adopting improvements, as is generally supposed; for it appears in the Blue-book containing evidence to the late Committee of the House of Commons on small arms, that Russia uses machinery from this country for the manufacture of small arms, whilst we continue their fabrication entirely by the uncertain accuracy of common workmen. Whether Russia should adopt wrought-iron ordnance or not, it would seem expedient for us to make preliminary experiments on such artillery without delay, so that should its superiority to cast-iron guns prove incontestible, an adequate provision of wrought-iron ordnance might be fabricated and sent to the seats of war before the commencement of the ensuing campaign. It evidently rests with the Government to decide on the kind of arm to be employed; but discussions on the subject by the Society of Arts could not fail to facilitate greatly a Ministerial decision upon it.

On the score of weight, it is possible that *steel* might be found a better material for ordnance than even wrought-iron. Sir Samuel Bentham suggested trials of it for this purpose, since he had ascertained that in point of strength a given amount of it might be obtained from steel for the same sum as equivalent strength of wrought and hammered iron would cost.

M. S. BENTHAM.

4th December, 1854.

[Since this article was in type Mr. Nasmyth has addressed a further note to the Editor of the *Times*, in which he states, "that Government have entered most cordially into my views, and in the most liberal spirit have empowered me to proceed forthwith in carrying out my designs."—Ed.]

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* Sir J. Bentham's "Naval Papers," No. 8, Page 171.

† Ibid.

Home Correspondence.

ADULTERATION OF FOOD.—BREAD.

Sir,—It is a most extraordinary fact that in this country, where the march of science and the mechanical arts has made the greatest strides, we should still be so much behind a great portion of the civilised world in the simple process of making bread. Bread, literally the staff of life of the working classes, and so necessary to all, should be pure, wholesome, and palatable, qualities unattainable in England, even if you make and bake your bread at home. I do not allude to those qualities which influence its appearance only, because it is easy enough to procure it light or well raised; and, in regard to colour, it may be equally nutritious and wholesome whether white or brown, or even approaching to black. The causes which have led to this lamentable state of things are many; the long-established habits and customs of the three classes concerned in the manufacture of bread—the farmer, the miller, and the baker.

It is, however, to the last-named, the baker, that the unwholesomeness of our English bread may be chiefly attributed, for if he would receive no flour from the miller but what was made from sound, well-kept wheat, the miller would purchase no deteriorated corn from the farmer, who would, in consequence, be compelled to preserve his wheat in a sound and wholesome state. But it is in vain to hope that the baker will ever act in so reasonable manner, because it is against his interest to do so, his object being to make the greatest number of four-pound loaves out of a given quantity of flour, say 90 loaves out of each sack, or 280 pounds of flour, while of home-made bread the sack will hardly yield 80 loaves. This clearly shows that the baker, by some means or other, makes a fraudulent gain upon the public of at least 10 loaves, or 40 pounds of bread, out of each sack consumed, and this fraud is accomplished by various means, most of which are notorious.

The baker will receive no flour from the miller that does not require an established quantity of water to make the dough of a proper consistency, a quality only to be obtained to the extent required by mixing a large proportion of very old corn, much heated in the rick, with a small quantity of good fresh wheat, in order to give the flour the necessary liveliness. Therefore it is that the miller will give the farmer a better price for old wheat, that has been much heated in the rick, than he will for new; and therefore it is that home breadmakers find it impossible to procure flour that has been made from good, wholesome, well-preserved grain.

The baker, however, is far from being satisfied with this first step; he must throw in a large quantity of alum and other chemicals, in order still further to increase the water-holding quality of his flour. The alum fraud has perhaps arisen from the fact that a few grains dissolved in muddy water will very soon cause it to become apparently limpid and pure, and fit to make white bread. But it was unfortunately discovered that the dough would bear, or stand up with, a much greater quantity of alum water than when made with the pure element, so that alum is now very largely introduced for that purpose alone. It is still more unfortunate that the addition of alum to bad flour greatly improves the appearance of the bread.

Various chemicals, together with common salt, are also introduced, in order to give a still greater water-holding quality to the flour, as well as to disguise the badness of the wheat from which it has been made. There are men in London called bakers' chemists, who supply them with what is called bakers' stuff, under the fictitious appellation of ferment, the composition of which is quite unknown to the baker; and this is the process by means of which they get up the beautifully white and light London bread.

The adulteration by the addition of farinaceous matters other than the flour of wheat, such as bean flour, rice, potatoes, &c., merely amounts to the fraud of selling one article for another, all such being more or less nutritious and wholesome. Some time since a new mode of making bread was introduced at the Marylebone workhouse by two French gentlemen, the object of which was to make 136 four-pound loaves out of one sack of flour (280 lbs.), an enormous increase on the fraudulent practice of our English bakers, who already make at least 10 loaves or 40 pounds of bread more than a sack of pure flour will produce. For the exposure of this fallacy, I beg to refer your readers to my letter on this subject inserted in your Journal, No. 75, page 406, and to Mr. Pepper's very admirable experiments on bread-making at the Royal Polytechnic Institution.

In regard to the millers, a few words will suffice, as I have already shown that their trade is in a great measure regulated by the bakers, of whom they are at once both the slaves and the masters. Their slaves, because they are compelled to produce flour of the greatest water-holding power. Their masters, because a large proportion of the bakers are deeply indebted to them. There is little doubt, however, that some portion of the alum which contaminates our bread, is introduced now and then by the miller. Alum is kept in the mill for the purpose of filling up any inconvenient porosity in the face of the millstones, and besides giving the water-holding power, it very much improves the appearance of flour made from half-spoilt or inferior wheat. It has been said that millers adulterate their flour with ground bones and plaster of Paris; but such assertions deserve no credit, because the cheapest article for that purpose, is undoubtedly low-priced half-perished wheat; and the miller's art consists in being able, when purchasing a really good honest sample, to calculate to a nicety how much inferior corn it will bear, so that, when doctored up, it shall produce to the eye fine white flour.

After all, it would appear that the millers of England, like the bakers, are rather behind those of other countries, especially the Italians, in real practical knowledge. Our English millers have a clever but a very absurd mode of building up their millstones of brickbats and plaster of Paris, with small bits of French burrs to make up the face, thereby losing the valuable crushing power of the greater specific gravity of an entire solid stone.

English mills also are much inferior in strength and power to those of Italy; for I have had corn well ground with broad, flaky, clean bran, at the rate of 12 bushels—I have seen it ground at the rate of 18, and at one mill at the rate of 24 bushels per hour, by one pair of four-feet stones, but the runner or upper millstone was 20 inches thick, and the bedstone upwards of two feet, set upon a vault of masonry in cement 18 inches thick. The greatest rate known in England is, I believe, five bushels per hour for each pair of stones.

In order to test the strength and power of an English mill, you have only to request the miller to grind a few quarters of full-sized Indian corn. He could not reduce it to fine flour, and in a very short time both the mill and machinery would be guttered to pieces. The same effect would follow the attempt to grind the dried chesnuts of the Apennine forests, which produce fine flour, as soft as velvet, and nearly as sweet as sugar. The ordinary bread of the Italian farm labourers is composed of the following materials, in the proportion of about a bushel of each, namely,—soft wheat, hard ditto, pease or vetch, barley, horse beans, and broad Windsor beans from the coast of Barbary, a mixture that would try the courage of any English miller who should be required to grind such stuff into fine flour, with but little bran. The millstones used for this purpose are made from various hard crystallized rocks, as granite, and both the upper and lower stones are of the same quality; but when soft wheat is to be ground with broad bran, the upper millstone only is hard, generally of diallage rock, the lower or bedstone being universally of porcellaneous limestone.

I need not say much about the farmers, as they must of course follow in the train of the other two, more especially as I may refer your readers to my communication on the "Preservation of Grain," inserted in your Number for October 21st, 1853. I may state, however, that the English agriculturist, generally speaking, is far worse provided with shelter for his crops when gathered, in this very variable climate, than the farmers of the south of Europe, where the climate is quite the reverse.

Some of your readers may think my description of the bread-making business rather overcharged, but I can assure them that it is by no means so. I only hope there may be exceptions, though I fear I may say with Virgil, "Apparent rari nantes in gurgite vasto."

HENRY W. REVELEY.

Parkstone, Dorset, Nov. 28, 1854.

THE TRADE COLLECTION OF THE GREAT EXHIBITION OF 1851.

Sir,—I observe by the last number of the *Journal of the Society of Arts*, that, in the discussion which recently took place at the Society on the subject of Mr. Simmonds's interesting paper, Mr. Bennoch expressed his regret at the dispersion, amongst the Provincial Museums of the country, of the valuable nucleus of a great Trade Museum possessed by Her Majesty's Commissioners for the Exhibition of 1851. A similar statement was contained in Mr. Simmonds's paper.

I beg to acquaint you that Mr. Bennoch and Mr. Simmonds are entirely mistaken in supposing that the collection in question has been so dispersed. The samples presented by the Commissioners to local museums consist in every case of duplicate specimens, which they were enabled to distribute without in the least injuring their own collection, which is still deposited at Kensington Palace, awaiting the time when matters will be sufficiently ripe for the full execution of the Commissioners' plans, as Mr. Simmonds, Mr. Bennoch, or any other Member of the Society of Arts may ascertain by personal inspection, on presenting his card to the officers of the Commission, at Kensington Palace.—I have the honour to be, sir, your obedient servant,

EDGAR A. BOWRING.

Whitehall, Dec. 4, 1854.

TRADE MUSEUM.

Sir,—The collection of animal produce and manufactures, which I am forming for the Society, is now rapidly assuming a definite form, as contributions arrive from day to day; the value of the future collection will, however, not so much depend upon the mere number of samples which it contains, as upon their instructive, suggestive, and illustrative importance; and the mode in which, by arrangement, exhibition, and description, their use is brought out and rendered evident.

I am therefore most anxious, at the present time, to ask the aid and co-operation of the individual Members of the Society, in the illustration of particular branches of industry, for I feel that I have a fair ground in asking their help, as the duty with which I am charged is the formation of a museum for the Society itself, and therefore I may reasonably conclude that the Members are not only those most interested in its progress, but also those from whom contributions may most fairly be expected.

My chief object in addressing this letter to you is, that of earnestly requesting the assistance of the Members of the Society, more especially those directly or indirectly engaged in business; and I would beg them to give such aid in the formation of the collection as may be in their power, and, remembering the objects of the museum, to mention it to their friends whenever opportunities occur. There are obviously many ways in which the Members can aid the collection, and I will now only mention a few. Thus I shall be very glad to receive:—

1. Samples of any description of animal produce, raw, prepared, or manufactured either British, colonial, or foreign.
2. Specimens illustrating the past or present mode of manufacture of woollen, silken, or leathern fabrics, or other articles, made from animal substances.
3. Specimens of animal manufacture of various ages, showing the quality of the article made a certain number of years ago, showing how it was kept, and illustrating its durability, or the mode in which it is gradually destroyed by age or use.
4. Information as to the modes of manufacture, processes, and all other matters connected with the arts in which animal substances are used.—I am, sir, yours faithfully,

EDWARD SOLLY.

Society of Arts, Adelphi, Dec. 4, 1854.

PERFORATING POSTAGE, RECEIPT, AND OTHER STAMPS.

7 Duke street, Adelphi, Nov. 25th, 1854.

Sir,—As the world is made up of little things, may I trespass on your space to suggest the following improvement on the present style of perforating our postage, receipt, and other stamps, which would save time and prevent the stamps from being torn across. If the holes were made diamond-shape instead of circular as at present, I can say, from experiments tried, that they would more effectually answer the purpose intended; the reason is simply that the force of tearing is guided by the angle of the diamond-shape into the direction it is wanted; whereas, in the circular hole, it is spread over nearly half the circumference of the hole. This is only putting into mechanical form the principle employed in tearing paper by means of a *crease*, the circular plan of perforation being analogous to tearing a piece of paper which has merely been *folded*. To be divided properly, the stamps as at present made require to be creased, but on the proposed plan they would not. In respect to the dynamics of the question, this plan would be just such an improvement in perforating postage stamps, as the conical balls used in Minié rifles are on the spherical balls used in the old rifles and guns.

Yours, &c.,

W. H. WALENN.

⁂ The suggestion of Mr. Walenn is said not to be new. It might probably accomplish the object required more easily than the present plan, but, apart from the mechanical question whether or not the machinery could be made exactly true, that is the "perforators," exactly to pass through the two metal plates between which the sheets are placed, doubts have been expressed that the sheets would be so limp, that they could not be handled without coming asunder, thus causing inconvenience to the sellers of stamps and the stamp office. Already the sheets are so weak that it frequently happens, when sheets are packed together, that they adhere to each other, and one or two stamps are torn out of the centre of a sheet, when the upper one is removed.—Ed.

COVERED HOMESTALLS.

Sir,—Considering I was precluded, by the rules of order, from making any public reply to a remark introduced into the proposition of a vote of thanks last evening to Mr. Mechi, for his interesting Paper on British Agriculture, and desirous that an observation so calculated to mislead should not pass unnoticed, may I beg of you to state that I feel satisfied the instance mentioned by Colonel Challoner, in which the manure taken from a Covered Homestall was found mouldy, can have been but an exceptional case, arising either from over-foddering or a deficiency of stock. I have, for several years, had considerable experience in the use of Covered Homestalls, and have never known a failure where they have been used in accordance with the design of their erection. A little consideration will, I am sure, satisfy the Colonel that no greater difficulty can attend the proper making of the manure in a Covered Homestall than under the system of box-feeding, if there be only a sufficient number of beasts for the area, and a careful supervision of the foddering, the Covered Homestall being in effect a series of boxes thrown together.

My own experience proves that 100 superficial feet for each horse or bullock, and 10 feet for each sheep or pig, will give ample space and yet secure the perfect conversion of the straw into manure of superior quality and in a fit state for immediate use.

Your obedient servant,
JAMES BEADEL.

25, Gresham-street, Dec. 7th, 1854.

DECIMAL COINAGE.

SIR,—At page 718, Vol. II, of your Journal, Sir C. Pasley, referring to his work published in 1834, says—"I was also the first in this country to recommend a decimal system of money, of accounts, and a decimal coinage based on the pound sterling as a unit," which he appears to have first suggested in 1831.

If the General will consult the "Pamphleteer" for July, 1814 (iv., 171), he will find, "A Sketch for a New Division and Subdivision of Money, Weights, and Coins," by Mercator, where the money of account is to be 1,000 mils =1*l.* Coins—gold, 1000 mils=1*l.*; 500 mils=½ pound. Silver, 250 mils = crown, 125 mils = half-crown, 50 mils = 1 shilling, 25 mils = sixpence. Copper, 5 mils= penny, 1 mil= farthing. This is exactly the plan recommended by General Pasley, but with the names now used adopted by the committee. In justice to General Pasley I may observe that the plan seemed entirely to have escaped notice until re-proposed by him. I have no idea of accusing the General of having copied "Mercator," for, curiously enough, this plan and the tenpenny plan (which was first proposed, I believe, in 1816) have been independently re-discovered many times at different periods.

Your's truly,
JOHN EDW. GRAY.

British Museum, Dec. 4, 1854.

Proceedings of Institutions.

MACCLESFIELD.—The nineteenth anniversary of the Society for Acquiring Useful Knowledge was celebrated on Monday fortnight, by the usual meeting in the Town-hall, the President (John Brocklehurst, Esq., M.P.) in the chair. The assemblage was more than usually numerous. The President, in opening the business, said he had for many years continually impressed upon the Managing Committee of the Society the necessity of never forgetting the fundamental rule upon which it was established, namely to provide means for acquiring useful knowledge for its members, and especially for the children of our industrious artizans. That rule had hitherto been abided by, even far beyond his most anxious wishes. The allowances to teachers had been increased, and various sums had been allotted to them as a remuneration for their devotion to the improvement of the pupils. The year had been marked by several extraordinary steps in advance.—Mr. Curwen, the honorary secretary, then read the report, from which it appeared that the new subscription news and reading-room, in connection with the Society, had now nearly 200 subscribers. Fifteen daily and nineteen weekly newspapers, in addition to the *Commer. Daily List*, and the leading quarterly, monthly and weekly serials, were provided, and telegraphic intelligence was furnished three times a day, and an hour on 'Change had lately been commenced for its mercantile members. The institution had thus become the centre of news and business, as well as the leading channel of learning and useful knowledge in the town. The library had been increased during the year by the purchase of 200 volumes, all of which had been carefully selected, and there was now an easy reference catalogue, which might be purchased for a small sum. The committee rejoiced that the classes were in a very thriving condition, as will be seen by the following tabular statement of their numbers and average attendance, viz:—

Classes.	No. of Pupils.		Average Attendance
Mathematical and Arithmetic—First Division, including Mathematics	59	...	40
Second Division	20	...	14
First Reading, Writing, and Dictation Class	26	...	23
Stenographical Class	10	...	7
Second Reading and Writing	60	...	40
Historical and Geographical	20	...	12
Grammar	50	...	30
Juvenile Class	80	...	66
Female Class, in which is taught Reading, Writing, Arithmetic, Grammar, Geography, English History, Dictation, and Sewing	40	...	30
	365		262

The reports of the teachers showed that good conduct, regularity of attendance, and assiduity, form the characteristics of each class. The committee have not thought it prudent to risk the Society's funds in engaging professional lecturers, but have made arrangements for the delivery, during the coming session, of gratuitous lectures and readings by several clergymen and gentlemen connected with the town and neighbourhood. Several concerts or musical lectures were given during the last session. The Society's annual excursion, of which upwards of two hundred of the members and their friends availed themselves, was this year to Liverpool, North Wales, and the Isle of Man. The receipts of the year had been £618 6s. 11d., the expenditure, £644 6s. 0d., leaving a balance due to the treasurer of £25 19s. 1d. The report having been adopted, on the motion of the Rev. C. A. J. Smith, seconded by Mr. John Wright, the honorary secretary proceeded to read the reports of the teachers and the adjudication of the prizes, after which their presentation by the president took place. Thanks were voted to the officers, to the chairman of the meeting, and to the mayor for the use of the hall.

MEETINGS FOR THE ENSUING WEEK.

MON. British Architects, 8.—Adjourned Discussion, "On the Architectural Splendour of the City of Beejapore."
Geographical, 8½.—1. Reports from Dr. Barth, dated Timbuctu. 2. Despatch reporting that the African Mission had not yet returned to Kuka from the South.
TUES. Syro-Egyptian, 7½.—1. "Oseudu—Epigraphic Letter of Baruch," translated from the Syriac, by Dr. Jolowiez. 2. Dr. Carl Abel, "On the Coptic language."
Civil Engineers, 8.—Discussion upon Mr. P. W. Barlow's Paper, "On some peculiar features of the Water-bearing Strata of the London Basin."
Medical and Chirurgical, 8½.
Zoological, 9.
WED. Literary Fund, 3.
Royal Soc. Literature, 4½.
Society of Arts, 8.—Mr. Harry Scrivenor, "On the Growth and Expansion of our Foreign and Colonial Trade in Iron, and the Fiscal Obstacles to its Extension."
Geological, 8.—1. Messrs. J. Prestwich, jun., and J. Brown, "On a Fossiliferous Deposit in the Drift near Salisbury." 2. Mr. W. J. Hamilton, "On the Tertiaries of Cassel." 3. Mr. J. W. Dawson, "On a Submerged Forest at Fort Lawrence."
Graphic, 8.
Archeological Assoc., 8½.
THURS. Antiquaries, 8.
Royal, 8½.
SAT. Asiatic, 2.
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Dec.* 1*st*, 1854.]

Dated 23*rd August*, 1854.

1852. J. H. Young, 66, Great College-street, Camden-town—Railways.

Dated 14*th September*, 1854.

1997. C. F. Stansbury, 17, Cornhill—Machinery for making lock springs. (A communication.)

Dated 10*th October*, 1854.

2166. S. Hancock, Nottingham—Looped fabrics.

Dated 3*rd November*, 1854.

2330. P. M. Parsons, 6, Duke-street, Adelphi—Railway axle bearings.

Dated 7*th November*, 1854.

2350. L. N. Langlois, Paris—Steam-boats.

Dated 13*th November*, 1854.

2400. Hon. W. E. Fitzmaurice, Kensington-gore—Bullets, shells, and other projectiles.
2401. A. E. B. Gobert, Montmirail, France—Stamping press.
2402. J. Armstrong, Normanton—Railway chairs and crossings.
2403. J. J. Abadie, Paris—Mode of working screw propellers.
2404. D. Caddick, Ebbw-vale iron works—Puddling furnaces.

Dated 14*th November*, 1854.

2405. J. H. Luson, Old Kent-road—Railway brakes.
2406. A. Pécoul, Marseilles—Sounding log.
2407. J. Howarth, Poplar—Boots and shoes.
2408. L. Kirkup, Newcastle-on-Tyne—Anvils.
2409. A. Turnbull, M.D., Manchester-square—Saw.
2410. H. Law, 15, Essex-street, Strand—Guns and projectiles.
2411. P. M. Parsons, 6, Duke-street, Adelphi—Projectiles.
2412. S. Pearson, Woolwich—Gun-barrels, pipes, and tubes.
2413. P. J. Meens, Paris—Wind instrument. (A communication.)

Dated 15*th November*, 1854.

2415. J. M. Chevron, and C. V. F. de Roulet, Paris—Machinery for textile fabrics.
2416. D. Davies, Wigmore street—Roller blinds.
2417. A. Warner, 11, New Broad street—Combining metals
2418. R. A. Brooman, 166, Fleet street—Gutta percha thread. (A communication.)
2419. W. H. Meriwether, Comal county, Texas—Wrought-iron posts for fences.
2420. F. J. Bramwell, 29, New Bridge street, Blackfriars—Steam-engines and steam-hammers.
2421. A. V. Newton, 66, Chancery-lane—Soluble silicates. (A communication.)
2422. J. H. Johnson, 47 Lincoln's-inn-fields—Air pistols. (A communication).
2423. J. Buchanan, Glasgow—Healds for weaving.

Dated 16*th November*, 1854.

2424. G. H. Ingall, Throgmorton-street—Communication between passengers and guards, &c.
2425. P. Knowles and E. Kirby, Bolton-le-Moors—Machinery for cleaning, &c., fibrous substances.
2426. R. Wilson, Birmingham—Ornamental fabrics.
2427. A. E. L. Bellford, 16, Castle-street, Holborn—Silk-winding machinery. (A communication.)
2428. P. A. le Comte de Fontaine Moreau, 4, South-street, Finsbury—Obtaining alcohol, &c. (A communication.)
2429. S. Henton, Lambeth—Saddle.
2430. W. C. Day, Strand—Portable camp bed.
2431. J. Platt, Oldham—Brick-making machinery.
2432. W. Hann, Hetton Fence-houses—Propelling vessels.
2433. W. Low, Lloft Wen, near Wrexham—Ventilating mines.

Dated 17*th November*, 1854.

2435. J. Wilson, Hopton—Printed warp fabrics.
2436. J. Bellamy, Upper street, Islington—Graining.
2437. J. Higgins and T. S. Whitworth, Salford—Shot, shells, &c.
2438. L. Castelain, 14, St. James's-place, Hampstead road—Pulp for paper and millboard.
2439. T. Kennedy, Kilmarnock—Projectiles.
2440. J. Macadam, M.D., Glasgow—Sizeing paper.
2441. C. Asprey, New Bond-street—Handles for dressing cases, &c.
2442. G. T. Bousfield, Loughborough-road, Brixton—Preventing incrustation in steam-boilers. (A communication.)

Dated 15*th November*, 1854.

2445. R. Gaunt, Birmingham—Dress fastening.
2446. H. R. Ramsbotham, Bradford—Combing fibrous substances.
2447. H. J. Luff, 7, Thanet-place, Temple-bar—Attacking hostile bodies, &c.
2448. T. F. Calard, Paris—Bedsteads.
2449. E. Belmer, 8, Macclesfield-street, City-road—Warming apparatus.

Dated 20*th November*, 1854.

2453. P. A. Dulaurens, and M. A. Laubry, Paris—Glove fastenings.

Dated 21*st November*, 1854.

2457. R. Knight, 9, Charterhouse-square—Testing iron as to its capacity for receiving magnetism,
2459. W. Beasley, Smethwick—Gun-barrels.
2461. E. Hunt, Glasgow—Screw-propellers.

Dated 22*nd November*, 1854.

2463. J. B. Bagary, Paris—Sawing apparatus.
2465. J. H. Johnson, 47, Lincoln's-inn-fields—Piled goods. (A communication.)
2467. R. Gibson, Hunslet—Carding machinery. (A communication.)

WEEKLY LIST OF PATENTS SEALED.

Sealed December 1*st*, 1854.

1321. Joseph Fourdrinier, 12, Sherborne-street, Islington—Improvements in machinery for washing, boiling, cleaning, and bleaching, rags, fabrics, and textile substances.
1373. Ephraim Smith, Carlisle-street—Improved watch key.

Sealed December 5*th*, 1854.

1250. Lemuel Brokelbank, Willesden—Improvements in manufacturing lubricating matters.
1258. John Mansfield, Stoke, Stafford—Improvement or improvements in steam-boilers.
1263. Joseph Kaye, Beeston, near Leeds—Improvements in machinery or apparatus for slubbing, roving, spinning, and doubling wool and other fibrous materials.
1266. James Leadbetter, William Wight, and Thomas Davis, Halifax—Improvements in machinery or apparatus for raising water and other fluids.
1271. Jean Baptiste Numa Erard, Paris—Improvements in the preparation of paint.
1275. John Nelson, and David Boyd, Selby—Improvements in preparing and scutching flax, hemp, and other substances.
1279. Julian Bernard, Club-chambers, Regent-street — Improvements in stitching and sewing machines, and in machines for securing and ornamenting parts of garments and other materials.
1281. John Braithwaite, Gower-street—Improved method of roofing or covering buildings, reservoirs, and other spaces requiring roofs or coverings.
1322. Alfred Vincent Newton, 66, Chancery-lane—Improvements in machinery for block printing.
1344. Joseph Day, Birmingham—Improvements in certain kinds of candlesticks.
1379. Isaac Farrell, Dublin—Improvements in fireproof flooring and roofing, which improvements are also applicable to the construction of walls and bridges, and other like structures.
1426. John Gregory Jones, Roscommon-street, Liverpool—Improvements in apparatus for teaching addition.
1498. James Lee Norton, Holland-street, Blackfriars — Improvements in turnstile counting apparatus.
1954. Robert Adams, King William-street, City—Improvements in breech-loading fire-arms.
2000. Robert Adams, King William-street, City—Improvements in machinery for boring and rifling the barrels of firearms.
2034. Alfred Vincent Newton, 66, Chancery-lane—Improvement in the rigging of sailing vessels.
2102. Arthur Boyle, Birmingham—Improvements in making umbrella and parasol stretchers.
2122. William Edward Newton, 66, Chancery-lane—Improvements in the construction of locks. (A communication.)
2164. Henry Thomas White, Queen's-terrace, Hammersmith, and George Roberts, Great Peter-street— Improved mode of rendering hats, caps, and other coverings for the head self-ventilating.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address
Nov. 29.	3665	Self-acting invalid iron chair bedstead ...	John Wren	232 Totenham-court-road
„ 30.	3666	Portable bedstead	Edm. Brown Bishop Wren	232 Totenham-court-road
Dec. 1.	3667	Improved fastening for porte-monnaies, cigar cases, and other similar articles	Christian Wemtraud, jun.	Offenbach, and 4, King-street, Cheapside